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1 PHEROMONE COMPOSITION

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3 The invention relates to compositions formulated to
4 attract fish, in order to capture them. More
5 particularly the composition may be used in a liquid
6 form to be applied onto or into bait, lures or flies
7 which are used by anglers and commercial fishermen
8 alike.

9
10 Angling and fishing are sports which attract a large
11 number of people. A wide range of bait, lures and
12 flies are marketed at these persons in order to provide
13 them with more success in catching fish.

14
15 Some organic compounds are known to be active in the
16 feeding response of some species by enhancing feeding
17 or attracting fish to a general area. They are known
18 to occur at low concentration levels in crustacea and
19 also in a range of decomposing animals. Such compounds
20 are small organic odorants.

21
22 It has been reported that women have a greater success
23 rate in catching salmon than male anglers (see *Salmon*
24 *and women*, W. Paterson & P. Behan, published by H, F &
25 G Witherby Ltd 1990).

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1 In one embodiment the composition is a liquid which
2 bait, lure, fly, ground bait and/or hooks can be dipped
3 into or the liquid can be poured onto the bait, lure,
4 fly, ground bait and/or hooks.

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6 The composition of the invention may also be formulated
7 as a spray to allow easy manipulation by the users and
8 could either be hand pumped or gas driven.

9
10 In a preferred embodiment the composition is formulated
11 to be injected into bait.

12
13 Alternatively the composition can be incorporated into
14 plastic bait.

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16 To attract fish one may apply the composition of the
17 invention on a bait or a suitable support and provide
18 it in area where fish are used to be found.

19
20 The composition may also be applied directly onto bare
21 hooks.

22
23 The composition of the invention can be formulated for
24 a wide range of applications including combining with
25 floatant, spraying flies, combining with greasing or
26 degreasing agents to enable bait to float or sink as
27 required.

28
29 The formulation can also be combined with ground bait
30 and dried for storage purposes.

31
32 Formulations of the present invention are surprisingly
33 effective in aqueous solution. Whereas a preferred
34 carrier is ethanol and a basic formulation can include
35 a salt of trimethylamine in ethanol, in use the
36 formulation produces trimethylamine on contact with

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1 water. In fishing, the formulation will be vastly
2 diluted in water and therefore it is most surprising
3 that use of the formulation can effectively enhance
4 fishing.

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6 The pheromones which may be advantageously used in a
7 composition according to the invention include the
8 following:

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10 Trimethylamine (TMA) (as derived from a salt of
11 trimethylamine such as the hydrochloride) is an
12 exceptionally interesting KIO pheromone. It occurs on
13 human skin and is especially important for females. It
14 is the characteristic odour of a menstruating female.
15 The odour profile is distinctive and is not shared by
16 closely related amines such as, for example,
17 dimethylamine. The aroma is that of fresh shell fish
18 at the threshold level. In fact it is thought that
19 most of the charm of oyster, scallops and the like
20 comes from TMA. The aroma changes with increasing
21 concentration and becomes increasingly unpleasant. At
22 a high level TMA will be perceived as an off-odour in
23 shell fish and the like, and as a sign of lack of
24 hygiene in a human subject.

25

26 The threshold concentration for humans is about 1ppb (1
27 part in 10^9) - this is low by olfactory standards.
28 There is, in fact, great individual variability and the
29 concentration varies around the mean figure by about 3
30 orders of magnitude. This gives rise to great
31 variability; for example, a crustacean may appear
32 delightful to a person of high threshold but may be
33 abhorrent to a person of low threshold (skin
34 sensitivity). See in that matter "Ageing and the Sense
35 of Smell" C, Van Toller, GH Dodd & A Billing, Charles T
36 Thomas, Publisher, Springfield, Illinois, USA, 1985.

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1 Another interesting pheromone to be used in the fish-
2 attracting composition is 1-Pyrroline. This is a rare
3 and little studied human pheromone. It is unstable and
4 therefore very difficult to study. It is formed by
5 oxidation of precursor molecules such as 1,4-
6 diaminobutane and 1,4-diaminopentane. These amines
7 occur in a variety of human tissues, and can be formed
8 from appropriate amino acids.

9
10 In order to overcome the instability problem when 1-
11 Pyrroline is to be used in a fish-attracting
12 composition of the invention, the parent amines (i.e.
13 the above mentioned precursors) are incorporated at a
14 high level in the composition. They will slowly
15 oxidize and release the unstable active odorant.

16
17 These parent amines are also called respectively,
18 putrescine and cadaverine, for obvious olfactory
19 reasons and occurred in decomposing animal tissue. The
20 human threshold is in the ppb range.

21
22 A further preferred pheromone is the 5-alpha-androst-
23 16-en-3-alpha-ol. This pheromone is a well-known pheromone
24 which is found in both males and females but is thought
25 to be more important for women (in contrast to the
26 related steroid pheromone, alpha-androstenone). The
27 threshold for human is in the low ppb range. The odour
28 is usually described as musky.

29
30 A still further preferred pheromone is 4-Methyloctanoic
31 acid which is characteristic of the scalp odour and may
32 be found in gamey meat. The threshold is unusually low
33 for a fatty acid and is in the region of ppb. It is
34 has been reported that women are much more sensitive to
35 this odorant than men.

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1 A particular composition according to the invention has
2 been tested in fishing experiments on the River Ness,
3 other rivers in the Highlands, and in Ireland and on a
4 variety of Lochs. Positive results have been obtained.

6 The composition of this particular non-limiting
7 composition is the following :

9	Component No	Name	Amount Required for
10			1000 litres of
11			solvent (ethanol)

13	1	Trimethylamine	7kg
14		hydrochloride	
15	2	1,4 diaminobutane	0.7kg
16	3	1,4 diaminopentane	0.1kg
17	4	indole	50 grm
18	5	skatole	40 grm
19	6	isovaleric acid	40 grm
20	7	4-methyloctanoic acid	10 grm
21	8	4-methylnonanoic acid	5 grm
22	9	phenylacetic acid	20 grm
23	10	2-methyl-E-butenic acid	5 grm
24	11	4-methylpentanoic acid	10 grm
25	12	2-methyl-2-pentenoic acid	10 grm
26	13	5-alpha-androst-16-en-3-alpha-ol	60 mg-6g

28 A more general preferred composition comprises

Component No	Name	Amount Required for 1000 litres of solvent
1	KIO Pheromone	0.05-50kg
2	Alkanoic acid	5g-1.5kg
3	Amines	0.1kg-8kg

Figure 1 consists of 11 small plots, each showing the relationship between a specific variable and the number of children. The y-axis for all plots is 'Number of children'. The x-axis for each plot is labeled with a variable name. The variables are: (a) Age, (b) Sex, (c) Education, (d) Income, (e) Religion, (f) Ethnicity, (g) Marital status, (h) Employment status, (i) Health status, (j) Social network, and (k) Life satisfaction. The plots show different trends, such as increasing, decreasing, or no significant relationship.

1 Even if a special emphasis has been given on the
2 utility of the composition in order to ease fishing it
3 is understood that the composition to attract fish as
4 above described may be used for other purposes. For
5 example it may be used to attract salmon into special
6 paths provided in order to help them to cross dams,
7 waterfalls or other obstructions.

9 Experimental Study

11 An initial study was carried out to establish a
12 relationship between the use of female pheromones at a
13 chosen concentration and the increase in the catch of
14 salmon, either by fish size or numbers caught using the
15 conventional rod and line method with a selected range
16 of hand tied salmon flies.

Three specialist salmon fly fishermen were chosen who regularly fished prime salmon rivers, have extensive combined specialist knowledge gained from 20 years of fly fishing, fish a regular pattern over the entire season, have experience of observing changes and variations in fish runs and catch methods and were willing to comply with strict rules with regard to reporting procedures.

27 Rivers chosen for the study covered the entire salmon
28 cycle, i.e Spring-Summer and Autumn salmon runs,
29 January-September 1997.

31 Results

33 Some interesting findings came to light at the season
34 end:

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[illegible]

Catch summary (Salmon caught)

Current information on official commercial salmon catch

1 ventures for 1997 would indicate a 20% reduction on the
2 1996 season.

3
4 Water temperatures were slightly higher than previous
5 years.

6
7 Most salmon for this study were caught on an imitation
8 shrimp fly dressing of various sizes.

9
10 All subjects chosen for this study were male with
11 average age of 45 years.

12
13 All subjects chosen tie their own flies, however,
14 similar selected shrimp/prawn flies were distributed to
15 all.

16
17 Salmon flies used were purchased from local fishing
18 tackle shops.

19
20 The final results of this initial trial study would
21 indicate some relationship between the choice of fly
22 with sample female pheromone and the traditional fly
23 fishing method.

24
25 One fisherman has fished for Sea Bass (commonly known
26 as Salmon Bass) off the east coast for many years, with
27 varying success. This specialist fishing activity
28 fished off chosen rocky points in July/August would
29 normally yield 1-2 fish per outing. This year, using
30 identical fishing lures, substantially improved bass
31 catches were recorded with better than average sizes
32 using the female pheromone formulation described
33 herein. Other specialist bass anglers fishing the same
34 waters did not use the formulation and did not return
35 above average catches.

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